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**Correlation Between Oxygen Content δ and Metal-Insulator Transition
in $\text{Sm}_{1.85}\text{Ce}_{0.15}\text{CuO}_{4-\delta}$ Antiferromagnetic Superconductor ***

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The role and amount of oxygen content parameter δ on the metal-insulator transition and superconductivity in oxygen-reducing $\text{Sm}_{1.85}\text{Ce}_{0.15}\text{CuO}_{4-\delta}$ antiferromagnetic superconductor ($T_N(\text{Sm/Ce}) = 5$ K) remains unclear up to now. The possibility of carrier (electrons or holes?) localization or depletion due to extra oxygen atoms in the partially-occupied apical site of 214 T'-phase (space group I4/mmm) is studied through x-ray Reitveld structural refinement, oxygen iodometric titration and oxygen K-edge x-ray-absorption analysis. The essential and related question concerning the valence of $\text{Ce}^{3+\alpha}$ on electron-doping is analyzed through magnetic study between undoped $\text{Sm}_2\text{CuO}_{4-\delta}$ ($T_N(\text{Sm}) = 6$ K) and insulating $\text{Sm}_{1.85}\text{Ce}_{0.15}\text{CuO}_{4-\delta}$. In addition, d-wave-like power law behavior was observed for $T_c = 21$ K $\text{Sm}_{1.85}\text{Ce}_{0.15}\text{CuO}_{4-\delta}$ and 23 K $\text{Pr}_{1.85}\text{Ce}_{0.15}\text{CuO}_{4-\delta}$ superconductors.

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